Introduction to Botany. Lecture 2

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August 26th, 2011

Outline

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Previous final question: the answer

Why plants are important?

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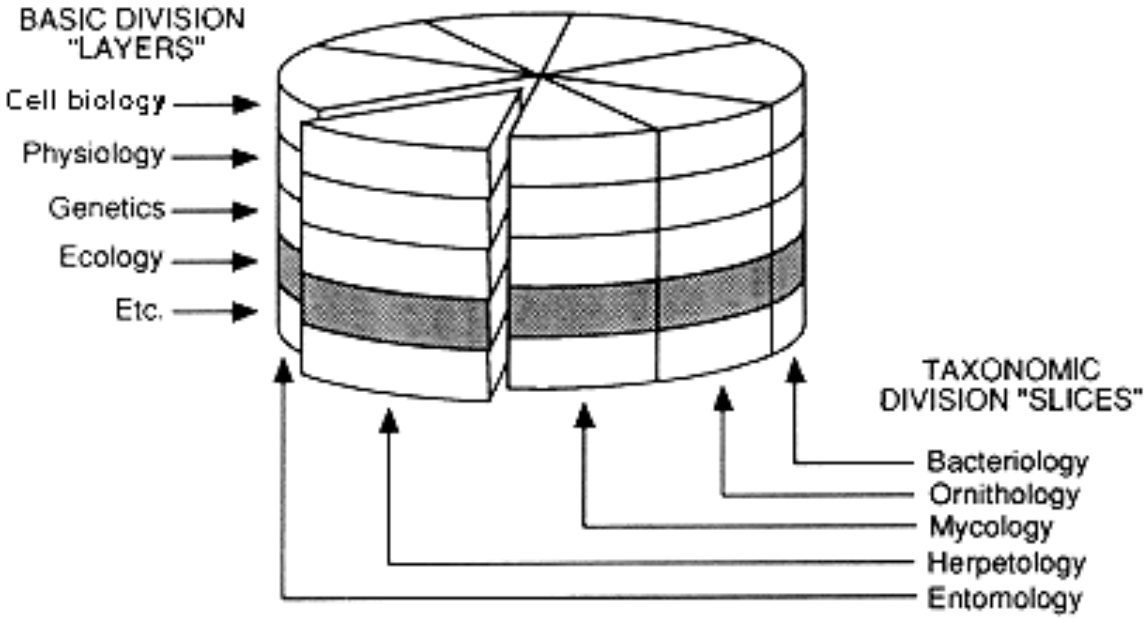
Why plants are important?

- Oxygen
- Food
- Environment, etc.

Levels of organization

- Ecosystems OR Taxa
- Populations
- Organisms
- Organs
- Tissues
- Cells
- Organelles
- Molecules

Place of botany



Layered cake of biology (Odum, 1971): botany is a “slice science”

Two definitions of plants

- Plants$_1$—ecological definition (based on the role in nature)
- Plants$_2$—taxonomic definition (based on the diversity)

Plants in ecology

Plants$_1$ are *primarily photosynthetic organisms*:

$$H_20 + CO_2 + \text{light} \rightarrow \text{carbohydrates} + O_2$$

Ranks

Most scientists accept seven main ranks:

- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

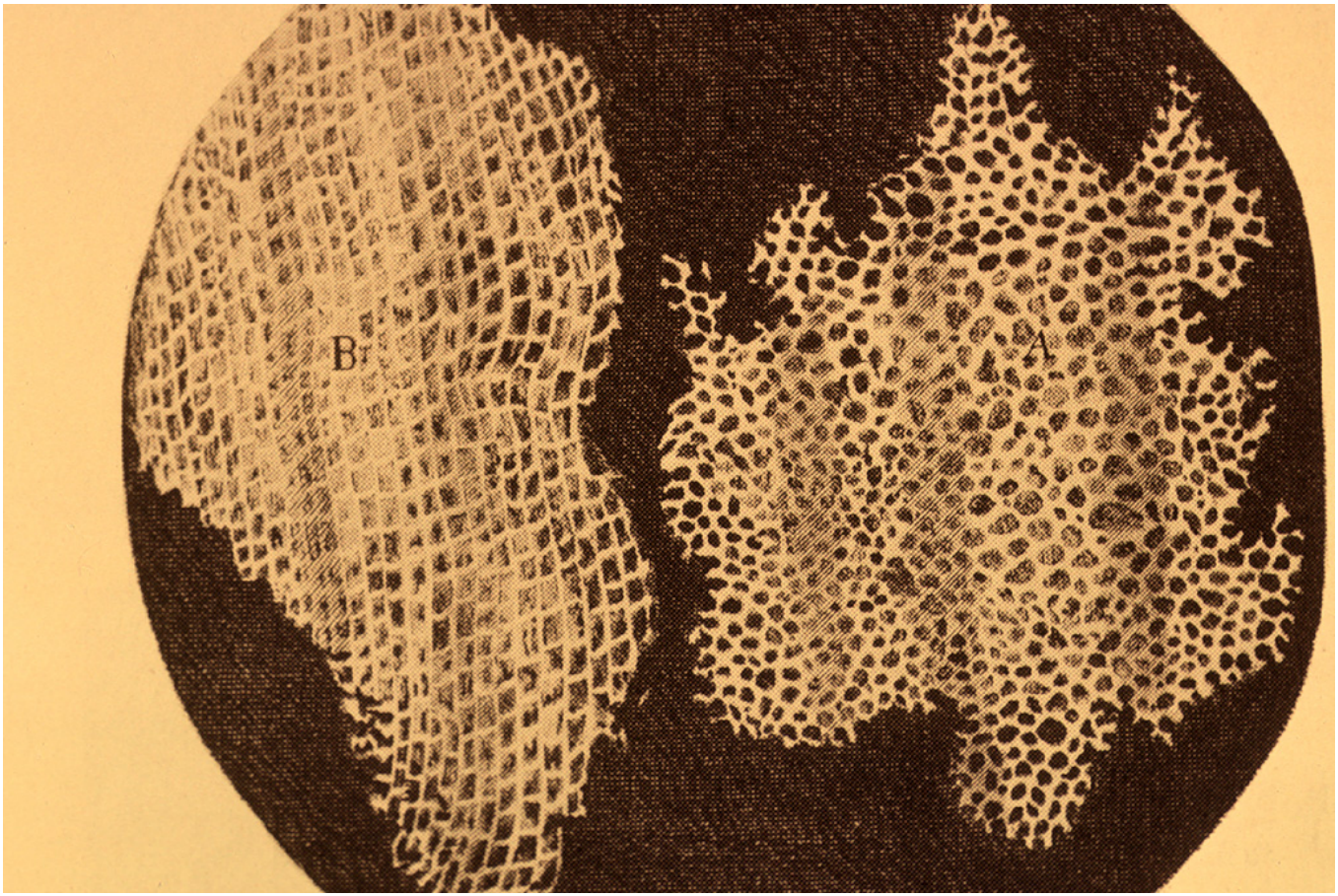
Names

- Names of species are binomials like *Solanum tuberosum* (potato)
- Names of other ranks are uninomials like **Vegetabilia** (plant kingdom)

Overview of classification

- Prokaryotes (*Monera*)
  - Bacteria: include cyanobacteria, or “blue-green algae”
  - Archaea
- Eukaryotes (*Eukaryota*)
  - Protists (*Protista*): include algae, fungi and unicellular “animals”
  - Animals (*Animalia*)
  - Plants$_2$ (*Vegetabilia*) are multi-tissued green terrestrial eukaryotes

Discovery of cells



In 1665, Robert Hooke looked at cork tissue under microscope and found “little boxes or cells distinct from one another ... that perfectly enclosed air”

Cell theory

1. All plants and animals are composed of cells (1838, Matthias Schleiden and Theodor Schwann)
2. Cells reproduce themselves (1858, Rudolf Virchow)
3. All cells arise by reproduction from previous cells (1858, Rudolf Virchow)

Miscroscopes

Light microscopy was an early technological breakthrough that contributed to our understanding of cell structure

Transmission electron microscopy (TEM) allows us to see the internal organization of cells and organelles

Scanning electron microscopy (SEM) provides an image of the surface of cells and organisms

Hooke's microscope

National Library of Medicine

Summary

- **Botany** as a “slice science” covers multiple levels of organisation
- **Cell theory** has three key points: all from cells, cells make cells, cells only from cells
- “Plants” have at least **two definitions**

For Further Reading

J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
Chapter 3.

Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapters 3.1–3.3.

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